CPC COOPERATIVE PATENT CLASSIFICATION

B22F WORKING METALLIC POWDER; MANUFACTURE OF ARTICLES FROM METALLIC POWDER; MAKING METALLIC POWDER (processes or devices for granulating materials in general B01J 2/00; making ceramics by compacting or sintering C04B, e.g. C04B 35/64; for the production of metals as such, see class C22; reduction or decomposition of metal compounds in general C22B; making alloys by powder metallurgy C22C; electrolytic production of metal powder C25C 5/00)

NOTE

This subclass covers the making of metallic powder only insofar as powder with specific physical characteristics is made;

In this subclass, the following terms or expressions are used with the meanings indicated:

- "metallic powder" covers powders containing a substantial proportion of non-metallic material;
- "powder" includes somewhat larger particles which are worked, obtained or behave in a manner similar to powder, e.g. fibres.

WARNING

[C2012.01]
1. The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:
B22F 3/035 covered by B22F 3/03

B22F 1/00 Special treatment of metallic powder, e.g. to facilitate working, to improve properties {(treatment of powder by mechanical means, e.g. by grinding, milling, rolling B22F 9/04)}; Metallic powders per se, e.g. mixtures of particles of different composition (C04, C08 take precedence; { amorphous powder B22F 9/002})

B22F 1/0003 . {Metallic powders per se; Mixtures of metallic powders; Metallic powders mixed with a lubricating or binding agent (making ferrous alloys using a mixture of prealloyed powders C22C 33/0207)}

B22F 1/0007 . . {Metallic powder characterised by its shape or structure, e.g. fibre structure }

B22F 1/0011 . . . {Metallic powder characterised by size or surface area only}

WARNING

Groups B22F 1/0011 and B22F 1/0014 are not complete, see also B22F 1/0007

B22F 1/0014 . . . . {by size mixtures or distribution}

B22F 1/0018 . . . . {Nanometer sized particles}

B22F 1/0022 . . . . . { Dispersions or suspensions thereof}{ WARNING: Not complete, see also B22F 1/0018}

B22F 1/0025 . . . . . { Nanofibres or nanotubes}{ WARNING: Not complete, see also B22F 1/0018}
B22F 1/004 . . . { Fibre structure (B22F 1/0025 takes precedence)}
B22F 1/0044 . . . {Nanometer size structures}
B22F 1/0048 . . . {Spherical powder}
B22F 1/0051 . . . . {Hollow particles}
B22F 1/0055 . . . { Flake form powders}{ WARNING: Not complete, see also B22F 1/0007}
B22F 1/0059 . . {Metallic powders mixed with a lubricating or binding agent or organic material}
B22F 1/0062 . . . { Powders coated with organic material}
B22F 1/007 . . . { Non-organic or metal salt binders or lubricants}
B22F 1/0074 . . . { Organic materials comprising a solvent e.g. for slip casting}
B22F 1/0077 . . . { Mixtures obtained by warm mixing}

B22F 1/0081 . { Special treatment of metallic powder, e.g. to facilitate working, to improve properties (coating with organic material B22F 1/0062)}
B22F 1/0085 . . {Thermal or thermo-mechanical treatment}
B22F 1/0088 . . {Chemical treatment, e.g. passivation}
B22F 1/0096 . . {Treatment resulting in the production of agglomerates}

B22F 1/02 . comprising coating of the powder {(coating with organic material B22F 1/0062; chemical surface treatment B22F 1/0088)}
B22F 1/025 . . {Metallic coating}

B22F 3/00 **Manufacture of workpieces or articles from metallic powder characterised by the manner of compacting or sintering; Apparatus specially adapted therefor;** {Presses and furnaces}

B22F 3/001 . {Starting from powder comprising reducible metal compounds (making ferrous alloys starting from compounds C22C 33/0235)}

B22F 3/002 . {Manufacture of articles essentially made from metallic fibres}

B22F 3/003 . {Apparatus, e.g. furnaces (in general F27B)}

B22F 3/004 . {Filling molds with powder (feeding material to presses in general B30B 15/302)}

B22F 3/005 . {Loading or unloading powder metal objects (transport in general B65G)}

B22F 3/006 . {Amorphous articles}
B22F 3/007 . . {by diffusion starting from non-amorphous articles prepared by powder metallurgy}

B22F 3/008 . {Selective deposition modelling (B22F 3/1055 takes precedence)}

B22F 3/02 . Compacting only
B22F 3/03 . . Press-moulding apparatus therefor
B22F 3/04 . . by applying fluid pressure { e.g. by cold isostatic pressing [CIP}]
B22F 3/045 . . . {Semi-isostatic pressure}

B22F 3/06 .. by centrifugal forces

B22F 3/08 .. by explosive forces {(generating shock waves in general G10K 15/043)}

B22F 3/087 .. using high energy impulses, e.g. magnetic field impulses

B22F 3/093 .. using vibrations {or friction}

B22F 3/10 . Sintering only

B22F 3/1003 .. {Use of special medium during sintering, e.g. sintering aid}

B22F 3/1007 ... {Atmosphere (B22F 3/1021 takes precedence)}

B22F 3/101 .... {Changing atmosphere}

B22F 3/1017 .. {Multiple heating or additional steps (B22F 3/101 takes precedence)}

B22F 3/1021 ... {Removal of binder or filler (removal of binder from ceramics C04B 35/638)}

B22F 3/1025 .... {not by heating only}

B22F 3/1028 ... {Controlled cooling}

B22F 3/1035 .. {Liquid phase sintering}

B22F 3/1039 .. {by reaction (B22F 3/001, B22F 3/23 take precedence)}

B22F 3/105 .. by using electric current {other than for infra-red radiant energy}, laser radiation or plasma (B22F 3/11 takes precedence); {by ultrasonic bonding (B22F 3/115 takes precedence)}

B22F 3/1055 ... { Selective sintering, i.e. stereolithography (selective sintering of powdered plastics B29C 67/0077)}

B22F 3/11 .. Making porous workpieces or articles

B22F 3/1103 ... {with particular physical characteristics}

B22F 3/1109 .... {Inhomogenous pore distribution (composite layers of porous nature B22F 7/002)}

B22F 3/1112 .... {comprising hollow spheres or hollow fibres}

B22F 3/1115 .... {comprising complex forms, e.g. honeycombs}

B22F 3/1118 .... {comprising internal reinforcements}

B22F 3/1121 ... {by using decomposable, meltable or sublimatable fillers}

B22F 3/1125 .... {involving a foaming process}

B22F 3/1134 .... {Inorganic fillers (carbonaceous or paper filler B22F 3/1121)}

B22F 3/1137 .... {by coating porous removable preforms}

B22F 3/114 ... {the porous products being formed by impregnation (B22F 3/1137, B22F 3/26 take precedence)}

B22F 3/1143 ... {involving an oxidation, reduction or reaction step}

B22F 3/1146 ... {After-treatment maintaining the porosity (B22F 3/114 takes precedence)}

B22F 3/115 . by spraying molten metal, i.e. spray sintering, spray casting {(also classified in C23C 4/121, C23C 4/185)}

B22F 3/12 . Both compacting and sintering (by forging B22F 3/17)

B22F 3/1208 .. {Containers or coating used therefor}

B22F 3/1216 ... {Container composition}

B22F 3/1225 .... {Glass}

B22F 3/1233 .... {Organic material}

B22F 3/1241 .... {layered}

B22F 3/125 . . . {Initially porous container}
B22F 3/1258 . . . {Container manufacturing}
B22F 3/1266 . . . . {by coating or sealing the surface of the preformed article, e.g. by melting}
B22F 3/1275 . . . . {by coating a model and eliminating the model before consolidation}
B22F 3/1283 . . . . {Container formed as an undeformable model eliminated after consolidation}
B22F 3/1291 . . . . {Solid insert eliminated after consolidation}
B22F 3/14 . . simultaneously
B22F 3/15 . . . Hot isostatic pressing
B22F 3/156 . . . . { by a pressure medium in liquid or powder form}
B22F 3/16 . . in successive or repeated steps { WARNING: Subgroups of B22F 3/16 are not complete, see also B22F 3/16}
B22F 3/162 . . . { Machining, working after consolidation}
B22F 3/164 . . . { Partial deformation or calibration}
B22F 3/168 . . . . { Local deformation}

B22F 3/17 . by forging
B22F 3/172 . . {Continuous compaction, e.g. rotary hammering (with axial pressure and without reduction of section B22F 3/204)}
B22F 3/177 . . {Rocking die forging}

B22F 3/18 . by using pressure rollers

B22F 3/20 . by extruding
B22F 3/204 . . {Continuous compaction with axial pressure and without reduction of section}

B22F 3/22 . for producing castings from a slip
B22F 3/222 . . {by freeze-casting or in a supercritical fluid}
B22F 3/225 . . { by injection molding} [WARNING: Not complete, see also B22F 3/22]
B22F 3/227 . . { by organic binder assisted extrusion}{ WARNING: Not complete, see also B22F 3/22}

B22F 3/23 . involving a self-propagating high-temperature synthesis or reaction sintering step {(making cermets by reaction sintering C22C 1/058)}

B22F 3/24 . After-treatment of workpieces or articles {(B22F 3/1146 takes precedence)}
B22F 3/26 . . Impregnating {(making ferrous alloys by impregnation C22C 33/0242)}

B22F 5/00 **Manufacture of workpieces or articles from metallic powder characterised by the special shape of the product**

B22F 5/003 . {Articles made for being fractured or separated into parts}

B22F 5/006 . {of flat products, e.g. sheets (B22F 3/1103 takes precedence; by using pressure rollers only see B22F 3/18)}

B22F 5/007 . {of moulds}

B22F 5/008 . { of engine cylinder parts or of piston parts other than piston rings (of piston rings B22F 5/02)}

B22F 5/009 . { of turbine components other than turbine blades (of turbine blades B22F 5/04)}

B22F 5/02 . of piston rings

B22F 5/04 . of turbine blades

B22F 5/06 . of threaded articles, e.g. nuts

B22F 5/08 . of toothed articles, e.g. gear wheels; of cam discs

B22F 5/085 . . { with helical contours}

B22F 5/10 . of articles with cavities or holes, not otherwise provided for in the preceding subgroups

B22F 5/106 . . { Tube or ring forms}{ WARNING: Not complete, see also B22F 5/10}

B22F 5/12 . of wires {(of tubes B22F 5/10)}

B22F 7/00 **Manufacture of composite layers, workpieces, or articles, comprising metallic powder, by sintering the powder, with or without compacting** { wherein at least one part is obtained by sintering or compression (application of coating layers by use of metal powders, see C23C)}

B22F 7/002 . {of porous nature}

B22F 7/004 . . {comprising at least one non-porous part}

B22F 7/006 . . . {the porous part being obtained by foaming}

B22F 7/008 . {characterised by the composition}

B22F 7/02 . of composite layers {(B22F 7/002 takes precedence)}

B22F 7/04 . . with one or more layers not made from powder, e.g. made from solid metal

B22F 7/06 . of composite workpieces or articles from parts, e.g. to form tipped tools {(B22F 7/002 takes precedence)}

B22F 7/062 . . {involving the connection or repairing of preformed parts}

B22F 7/064 . . . {using an intermediate powder layer}

B22F 7/08 . . with one or more parts not made from powder {(B22F 7/062 takes precedence)}

B22F 8/00 **Manufacture of articles from scrap or waste metal particles**

B22F 9/00 **Making metallic powder or suspensions thereof**

B22F 9/002 . {amorphous or microcrystalline}

B22F 9/004 . . {by diffusion, e.g. solid state reaction}

B22F 9/005 . . . {Transformation into amorphous state by milling}

B22F 9/007 . . {Transformation of amorphous into microcrystalline state}

B22F 9/008 . . {Rapid solidification processing}

B22F 9/02 . using physical processes
B22F 9/023 . . {Hydrogen absorption}
B22F 9/026 . . {Spray drying of solutions or suspensions}
B22F 9/04 . . starting from solid material, e.g. by crushing, grinding or milling ({C22C 1/1084 takes precedence}; crushing, grinding or milling, in general, see the relevant subclasses, e.g. B02C)
B22F 9/06 . . starting from liquid material
B22F 9/08 . . . by casting, e.g. through sieves or in water, by atomising or spraying (using electric discharge B22F 9/14)
B22F 9/082 . . . . { atomising using a fluid (using centrifugal force B22F 9/10)}
B22F 9/10 . . . . using centrifugal force
B22F 9/12 . . starting from gaseous material
B22F 9/14 . . using electric discharge

B22F 9/16 . using chemical processes
B22F 9/18 . . with reduction of metal compounds
B22F 9/20 . . . starting from solid metal compounds
B22F 9/22 . . . . using gaseous reductors
B22F 9/24 . . . starting from liquid metal compounds, e.g. solutions
B22F 9/26 . . . . using gaseous reductors
B22F 9/28 . . . starting from gaseous metal compounds
B22F 9/30 . . with decomposition of metal compounds, e.g. by pyrolysis
B22F 9/305 . . . {of metal carbonyls}

B22F 2001/00 **Special treatment of metallic powder, e.g. to facilitate working, to improve properties** {(treatment of powder by mechanical means, e.g. by grinding, milling, rolling B22F 9/04)}**; Metallic powders per se, e.g. mixtures of particles of different composition** (C04, C08 take precedence; { amorphous powder B22F 9/002})

B22F 2001/0003 . {Metallic powders per se; Mixtures of metallic powders; Metallic powders mixed with a lubricating or binding agent (making ferrous alloys using a mixture of prealloyed powders C22C 33/0207)}
B22F 2001/0007 . . {Metallic powder characterised by its shape or structure, e.g. fibre structure }
B22F 2001/0011 . . . {Metallic powder characterised by size or surface area only}

WARNING

Groups B22F 1/0011 and B22F 1/0014 are not complete, see also B22F 1/0007

B22F 2001/0018 . . . . {Nanometer sized particles}
B22F 2001/0029 . . . . . Hollow particles, including tubes and shells
B22F 2001/0033 . . . . . Flake form nanoparticles

B22F 2001/0037 . . . . . Complex form nanoparticles , e.g.. prism, pyramid, octahedron

B22F 2001/0059 . . {Metallic powders mixed with a lubricating or binding agent or organic material}

B22F 2001/0066 . . . Organic binder comprising a mixture or obtained by reaction of more than one component other than solvent, lubricant

B22F 2001/0081 . { Special treatment of metallic powder, e.g. to facilitate working, to improve properties (coating with organic material B22F 1/0062)}

B22F 2001/0088 . . {Chemical treatment, e.g. passivation}

B22F 2001/0092 . . . Making a dispersion

B22F 2003/00 **Manufacture of workpieces or articles from metallic powder characterised by the manner of compacting or sintering; Apparatus specially adapted therefor;** {Presses and furnaces}

B22F 2003/02 . Compacting only

B22F 2003/023 . . Lubricant mixed with the metal powder

B22F 2003/026 . . Mold wall lubrication or article surface lubrication

B22F 2003/03 . . Press-moulding apparatus therefor

B22F 2003/031 . . . with punches moving in different directions in different planes

B22F 2003/033 . . . with multiple punches working in the same direction

B22F 2003/10 . Sintering only

B22F 2003/1003 . . {Use of special medium during sintering, e.g. sintering aid}

B22F 2003/1014 . . . Getter

B22F 2003/1032 . . comprising a grain growth inhibitor

B22F 2003/1042 . . with support for articles to be sintered

B22F 2003/1046 . . . with separating means for articles to be sintered

B22F 2003/105 . . by using electric current {other than for infra-red radiant energy}, laser radiation or plasma (B22F 3/11 takes precedence); {by ultrasonic bonding (B22F 3/115 takes precedence)}

B22F 2003/1051 . . . by electric discharge

B22F 2003/1052 . . . assisted by energy absorption enhanced by the coating or powder

B22F 2003/1053 . . . by induction

B22F 2003/1054 . . . by microwave

B22F 2003/1055 . . . { Selective sintering, i.e. stereolithography (selective sintering of powdered plastics B29C 67/0077)}

B22F 2003/1056 . . . . Apparatus components, details or accessories

B22F 2003/1057 . . . . . for control or data processing, e.g. algorithms

B22F 2003/1058 . . . . . Support structures for the 3D object during manufacturing, e.g. using sacrificial material

B22F 2003/1059 . . . . . for cleaning or recycling

B22F 2003/11 . . Making porous workpieces or articles

B22F 2003/1103 . . . {with particular physical characteristics}

B22F 2003/1106 . . . . Product comprising closed porosity

B22F 2003/1121 . . . {by using decomposable, meltable or sublimatable fillers}

B22F 2003/1125 .... {involving a foaming process}
B22F 2003/1128 ..... Foaming by expansion of dissolved gas, other than with foaming agent
B22F 2003/1131 ..... Foaming in a liquid suspension and decomposition

B22F 2003/12 . Both compacting and sintering (by forging B22F 3/17)
B22F 2003/14 .. simultaneously
B22F 2003/145 ... by warm compacting, below debindering temperature
B22F 2003/15 ... Hot isostatic pressing
B22F 2003/153 .... apparatus specific to HIP
B22F 2003/16 .. in successive or repeated steps { WARNING: Subgroups of B22F 3/16 are not complete, see also B22F 3/16}
B22F 2003/164 ... { Partial deformation or calibration}
B22F 2003/166 .... Surface calibration, blasting, burnishing, sizing, coining

B22F 2003/17 . by forging
B22F 2003/175 .. by hot forging, below sintering temperature

B22F 2003/18 . by using pressure rollers
B22F 2003/185 .. by hot rolling, below sintering temperature

B22F 2003/20 . by extruding
B22F 2003/202 .. with back pressure
B22F 2003/206 .. Hydrostatic or hydraulic extrusion
B22F 2003/208 .. Warm or hot extruding

B22F 2003/24 . After-treatment of workpieces or articles {(B22F 3/1146 takes precedence)}
B22F 2003/241 .. Chemical after-treatment on the surface
B22F 2003/242 ... Coating
B22F 2003/244 ... Leaching
B22F 2003/245 .. Making recesses, grooves etc on the surface by removing material
B22F 2003/247 .. Removing material: carving, cleaning, grinding, hobbing, honing, lapping, polishing, milling, shaving, skiving, turning the surface
B22F 2003/248 .. Thermal after-treatment

B22F 2005/00 Manufacture of workpieces or articles from metallic powder characterised by the special shape of the product

B22F 2005/001 . Cutting tools, earth boring or grinding tool other than table ware

B22F 2005/002 . Tools other than cutting tools

B22F 2005/004 . Article comprising helical form elements (B22F 5/085 takes precedence)

B22F 2005/005 . Article surface comprising protrusions

B22F 2005/10 . of articles with cavities or holes, not otherwise provided for in the preceding subgroups

B22F 2005/103 . . Cavity made by removal of insert

B22F 2007/00 **Manufacture of composite layers, workpieces, or articles, comprising metallic powder, by sintering the powder, with or without compacting** { wherein at least one part is obtained by sintering or compression (application of coating layers by use of metal powders, see C23C)}

B22F 2007/02 . of composite layers {(B22F 7/002 takes precedence)}
B22F 2007/04 . . with one or more layers not made from powder, e.g. made from solid metal
B22F 2007/042 . . . characterised by the layer forming method
B22F 2007/045 . . . . accompanied by fusion or impregnation
B22F 2007/047 . . . . non-pressurised baking of the paste or slurry containing metal powder

B22F 2007/06 . of composite workpieces or articles from parts, e.g. to form tipped tools {(B22F 7/002 takes precedence)}
B22F 2007/062 . . {involving the connection or repairing of preformed parts}
B22F 2007/066 . . . using impregnation
B22F 2007/068 . . . repairing articles

B22F 2009/00 **Making metallic powder or suspensions thereof**

B22F 2009/001 . from scrap particles

B22F 2009/02 . using physical processes
B22F 2009/04 . . starting from solid material, e.g. by crushing, grinding or milling ({C22C 1/1084 takes precedence}; crushing, grinding or milling, in general, see the relevant subclasses, e.g. B02C)
B22F 2009/041 . . . by mechanical alloying , e.g. blending, milling
B22F 2009/042 . . . using a particular milling fluid
B22F 2009/043 . . . by ball milling
B22F 2009/044 . . . by jet milling
B22F 2009/045 . . . by other means than ball or jet milling
B22F 2009/046 . . . . by cutting
B22F 2009/047 . . . . by rolling
B22F 2009/048 . . . by pulverising a quenched ribbon
B22F 2009/049 . . . by pulverising at particular temperature
B22F 2009/06 . . starting from liquid material
B22F 2009/065 . . . Melting inside a liquid, e.g. making spherical balls
B22F 2009/08 . . . by casting, e.g. through sieves or in water, by atomising or spraying (using electric discharge B22F 9/14)
B22F 2009/0804 . . . . Dispersion in or on liquid, other than with sieves
B22F 2009/0808 . . . . . Mechanical dispersion of melt, e.g. by sieves
B22F 2009/0812 . . . . . Pulverisation with a moving liquid coolant stream, by centrifugally rotating stream
B22F 2009/0816 . . . . by casting with pressure or pulsating pressure on the metal bath

B22F 2009/082 .... { atomising using a fluid (using centrifugal force B22F 9/10)}
B22F 2009/0824 ..... with a specific atomising fluid
B22F 2009/0828 ..... with water
B22F 2009/0832 ..... Handling of atomising fluid, e.g. heating, cooling, cleaning, recirculating
B22F 2009/0836 ..... with electric or magnetic field or induction
B22F 2009/084 ..... combination of methods
B22F 2009/0844 ..... in controlled atmosphere
B22F 2009/0848 ..... Melting process before atomisation
B22F 2009/0852 ..... Electroslag melting
B22F 2009/0856 ..... Skull melting
B22F 2009/086 ..... Cooling after atomisation
B22F 2009/0864 ..... by oil, other non-aqueous fluid or fluid-bed cooling
B22F 2009/0868 ..... by injection of solid particles in the melt stream
B22F 2009/0872 ..... by water
B22F 2009/0876 ..... by gas
B22F 2009/088 ..... Fluid nozzles , e.g. angle, distance
B22F 2009/0884 ..... Spiral fluid
B22F 2009/0888 ..... casting construction of the melt process, apparatus, intermediate reservoir e.g. tundish, devices for temperature control
B22F 2009/0892 ..... casting nozzle; controlling metal stream in or after the casting nozzle
B22F 2009/0896 ..... particle transport, separation: process and apparatus

B22F 2009/16 . using chemical processes
B22F 2009/165 .. Chemical reaction in an Ionic Liquid [IL] (B22F 2009/245 takes precedence)
B22F 2009/18 .. with reduction of metal compounds
B22F 2009/24 ... starting from liquid metal compounds, e.g. solutions
B22F 2009/245 .... Reduction reaction in an Ionic Liquid [IL]

B22F 2201/00 Treatment under specific atmosphere

B22F 2201/01 . Reducing atmosphere
B22F 2201/013 .. Hydrogen
B22F 2201/016 .. NH3

B22F 2201/02 . Nitrogen

B22F 2201/03 . Oxygen

B22F 2201/04 . CO or CO2

B22F 2201/05 . Water or water vapour

B22F 2201/10 . Inert gases

B22F 2201/11 . . Argon
B22F 2201/12 . . Helium

B22F 2201/20 . Use of vacuum

B22F 2201/30 . Carburising atmosphere

B22F 2201/32 . Decarburising atmosphere

B22F 2201/40 . Metal compounds

B22F 2201/50 . air

B22F 2202/00 Treatment under specific physical conditions

B22F 2202/01 . Use of vibrations

B22F 2202/03 . Treatment under cryogenic or supercritical conditions

B22F 2202/05 . Use of magnetic field

B22F 2202/06 . Use of electric fields

B22F 2202/07 . by induction

B22F 2202/09 . Use of non-gravitational conditions

B22F 2202/11 . Use of irradiation

B22F 2202/13 . Use of plasma

B22F 2202/15 . Use of fluidised beds

B22F 2202/17 . use of centrifugal or vortex forces

B22F 2203/00 Controlling

B22F 2203/01 . To-be-deleted with administrative transfer to B22F 2203/00

B22F 2203/03 . for feed-back

B22F 2203/05 . thermal expansion

B22F 2203/11 . temperature, temperature profile

B22F 2203/13 . pressure

B22F 2203/15 . weight

B22F 2207/00 **Aspects of the compositions, gradients**

B22F 2207/01 . Composition gradients
B22F 2207/03 . . of the metallic binder phase in cermets
B22F 2207/05 . . . eta-phase
B22F 2207/07 . . Particles with core-rim gradient

B22F 2207/11 . Gradients other than composition gradients, e.g. size gradients
B22F 2207/13 . . Size gradients
B22F 2207/15 . . Temperature gradients
B22F 2207/17 . . density or porosity gradients

B22F 2207/20 . Cooperating components

B22F 2301/00 **Metallic composition of the powder or its coating**

B22F 2301/05 . Light metals
B22F 2301/052 . . Aluminium
B22F 2301/054 . . Alkali metals, i.e. Li, Na, K, Rb, Cs, Fr
B22F 2301/056 . . Alkaline metals, i.e. Ca, Sr, Ba, Ra
B22F 2301/058 . . Magnesium

B22F 2301/10 . Copper

B22F 2301/15 . Nickel or cobalt
B22F 2301/155 . . Rare Earth - Co or -Ni intermetallic alloys

B22F 2301/20 . Refractory metals
B22F 2301/205 . . Titanium, zirconium or hafnium

B22F 2301/25 . Noble metals, i.e. Ag Au, Ir, Os, Pd, Pt, Rh, Ru
B22F 2301/255 . . Silver or gold

B22F 2301/30 . Low melting point metals, i.e. Zn, Pb, Sn, Cd, In, Ga

B22F 2301/35 . Iron
B22F 2301/355 . . Rare Earth - Fe intermetallic alloys

B22F 2301/40 . Intermetallics other than rare earth-Co or -Ni or -Fe intermetallic alloys

B22F 2301/45 . Rare earth metals, i.e. Sc, Y, Lanthanides (57-71)

B22F 2302/00 **Metal Compound , non-Metallic compound or non-metal composition of the powder or its coating**

B22F 2302/05 . Boride

B22F 2302/10 . Carbide
B22F 2302/105 . . Silicium carbide (SiC)

B22F 2302/15 . Carbonitride

B22F 2302/20 . Nitride

B22F 2302/205 . Cubic boron nitride

B22F 2302/25 . Oxide
B22F 2302/253 . . Aluminum oxide (Al2O3)
B22F 2302/256 . . Silicium oxide (SiO2)

B22F 2302/30 . Oxynitride

B22F 2302/35 . Complex boride, carbide, carbonitride, nitride, oxide or oxynitride

B22F 2302/40 . Carbon, graphite
B22F 2302/403 . . Carbon nanotube
B22F 2302/406 . . Diamond

B22F 2302/45 . Others, including non-metals

B22F 2303/00 **Functional details of metal or compound in the powder or product,**

B22F 2303/01 . Main component

B22F 2303/05 . Compulsory alloy component

B22F 2303/10 . Optional alloy component

B22F 2303/15 . Intermetallic

B22F 2303/20 . Coating by means of particles

B22F 2303/25 . Coating by means of fibres

B22F 2303/30 . Coating alloy

B22F 2303/35 . Molten metal infiltrating a metal preform

B22F 2303/40 . Layer in a composite stack of layers, workpiece or article
B22F 2303/405 . . Support layer

B22F 2303/45 . Part of a final mixture to be processed further

B22F 2304/00 Physical aspects of the powder

B22F 2304/05 . Submicron size particles
B22F 2304/052 . . Particle size below 1nm
B22F 2304/054 . . Particle size between 1 and 100 nm
B22F 2304/056 . . Particle size above 100 nm up to 300 nm
B22F 2304/058 . . Particle size above 300 nm up to 1 micrometer

B22F 2304/10 . Micron size particles, i.e. above 1 micrometer up to 500 micrometer

B22F 2304/15 . Millimeter size particles, i.e. above 500 micrometer

B22F 2998/00 Supplementary information concerning processes or compositions relating to powder metallurgy

B22F 2998/10 . Processes characterised by the sequence of their steps

B22F 2999/00 Aspects linked to processes or compositions used in powder metallurgy